10. de Leon-Casasola OA, Lema MJ: General versus regional anesthesia for peripheral vascular surgery (letter). ANESTHESIOLOGY 1996; 85:224–5

11. Bode RH Jr, Lewis KD, Pierce ET: General versus regional anesthesia for peripheral vascular surgery (letter). ANESTHESIOLOGY 1996; 85:225

12. Early Breast Cancer Trialists' Collaborative Group: Systemic treatment of early breast cancer by hormonal, cytotoxic, or immune therapy: 133 randomised trials involving 31,000 recurrences and 24,000 deaths among 75,000 women. Lancet 1992; 339:1–15, 71–85

13. Fibrinolytic Therapy Trialists' Collaborative Group: Indications for fibrinolytic therapy in suspected acute myocardial infarction: Collaborative overview of early mortality and major morbidity results from all randomized trials of more than 1,000 patients. Lancet 1994; 343:311–22

14. Moller IW, Hjortso E, Krantz T, Wandall E, Kehlet H: The modifying effect of spinal anesthesia on intra- and postoperative adrenocortical and hyperglycaemic response to surgery. Acta Anaesthesiol Scand 1984; 28:266–9

15. Raggi R, Dardik H, Mauro AL: Continuous epidural anesthesia and postoperative epidural narcotics in vascular surgery. Am J Surg 1987; 154:192–7

16. Kehlet H: Epidural analgesia and the endocrine-metabolic response to surgery: Update and perspectives. Acta Anaesthesiol Scand 1984; 28:125–7

(Accepted for publication February 3, 1997.)

Anesthesiology
1997; 86:1010

In Reply:—Dr. Rigg *et al.* suggest that the relatively low cardiac morbidity and mortality observed in the study by Bode *et al.*[1] reflects the case mix of patients in that study. They hypothesize that studying only high-risk patients would generate a more accurate estimate of the effect of anesthesia choice on cardiac outcome.

To the extent that randomized controlled trials enroll less ill patients than are typically seen among the total surgical population, the low event rates seen in such studies may be partially an artifact. However, patients undergoing lower extremity vascular surgery, including those enrolled in trials, are already high-risk.[2] It is not at all clear how Rigg *et al.* would subclassify such patients into "high" high-risk and "low" high-risk, nor do they provide a source for these estimated event rates. And would patients at high high-risk, even if they could be identified, undergo elective vascular surgery? Most physicians would consider an expected perioperative mortality of 20% to be prohibitively great. A study enrolling such patients may take forever. Finally, there is little, if any, reason to believe that intraoperative anesthesia choice would reduce perioperative mortality rate, which has variety of causes,[3] by 25%.

Our review and informal meta-analysis were performed on published trials, weighted appropriately for sample size.[4] Because publication bias generally favors the publication of trials with positive results, inclusion of unpublished trials generally leads to a reduction in the summary effect size, not the converse. Similarly, although most of the trials had relatively few patients, small published trials generally overestimate the effect of a treatment. Although these potential biases would favor detecting a beneficial effect of regional anesthesia compared with general anesthesia, no significant benefit was found: 0% (95% CI, −3% to +3%) difference for in-hospital or short-term cardiac mortality and 1.5% (95%CI, −4% to +7%) difference for any cardiac event or death favoring general anesthesia.[5]

Despite the potential physiologic advantages from regional anesthesia compared with general anesthesia in patients undergoing vascular surgery, there has been no demonstrated statistical, and more importantly, clinical benefit on cardiac outcomes. There may, however, be other reasons to prefer one of the techniques. Nor does the lack of benefit mean that additional research in reducing perioperative car-diac morbidity and mortality is futile. Other strategies, such as those addressing the management of postoperative pain or perioperative myocardial ischemia, are promising.[6] As to further trials comparing the effects of currently available techniques of regional and general anesthesia on cardiac outcome, our conclusion still stands: none are needed.

Alan S. Go, M.D.
Warren S. Browner, M.D., M.P.H.
General Internal Medicine Section
Veterans Administration Medical Center, 111A1
4150 Clement Street
San Francisco, California 94121

References

1. Bode RJ, Lewis KP, Zarich SW, et al: Cardiac outcome after peripheral vascular surgery. Comparison of general and regional anesthesia. ANESTHESIOLOGY 1996; 84(1):3–13

2. Wong T, Detsky AS: Preoperative cardiac risk assessment for patients having peripheral vascular surgery. Ann Intern Med 1992; 116(9):743–53

3. Browner WS, Li J, Mangano DT for the SPI Research Group: In-hospital and long term mortality in male veterans following noncardiac surgery. JAMA 1992; 268:228–32

4. Petitti D: Meta-analysis, decision analysis, and cost-effective analysis. New York, Oxford University, 1994; pp 104–5

5. Go AS, Browner WS: Cardiac outcomes after regional or general anesthesia. Do we have the answer? (editorial). ANESTHESIOLOGY 1996; 84(1):1–2

6. Mangano D, Layug E, Wallace A, Tateo I: Effect of atenolol on mortality and cardiovascular morbidity after noncardiac surgery. N Engl J Med 1996; 335(23):1713–20

(Accepted for publication February 3, 1997.)